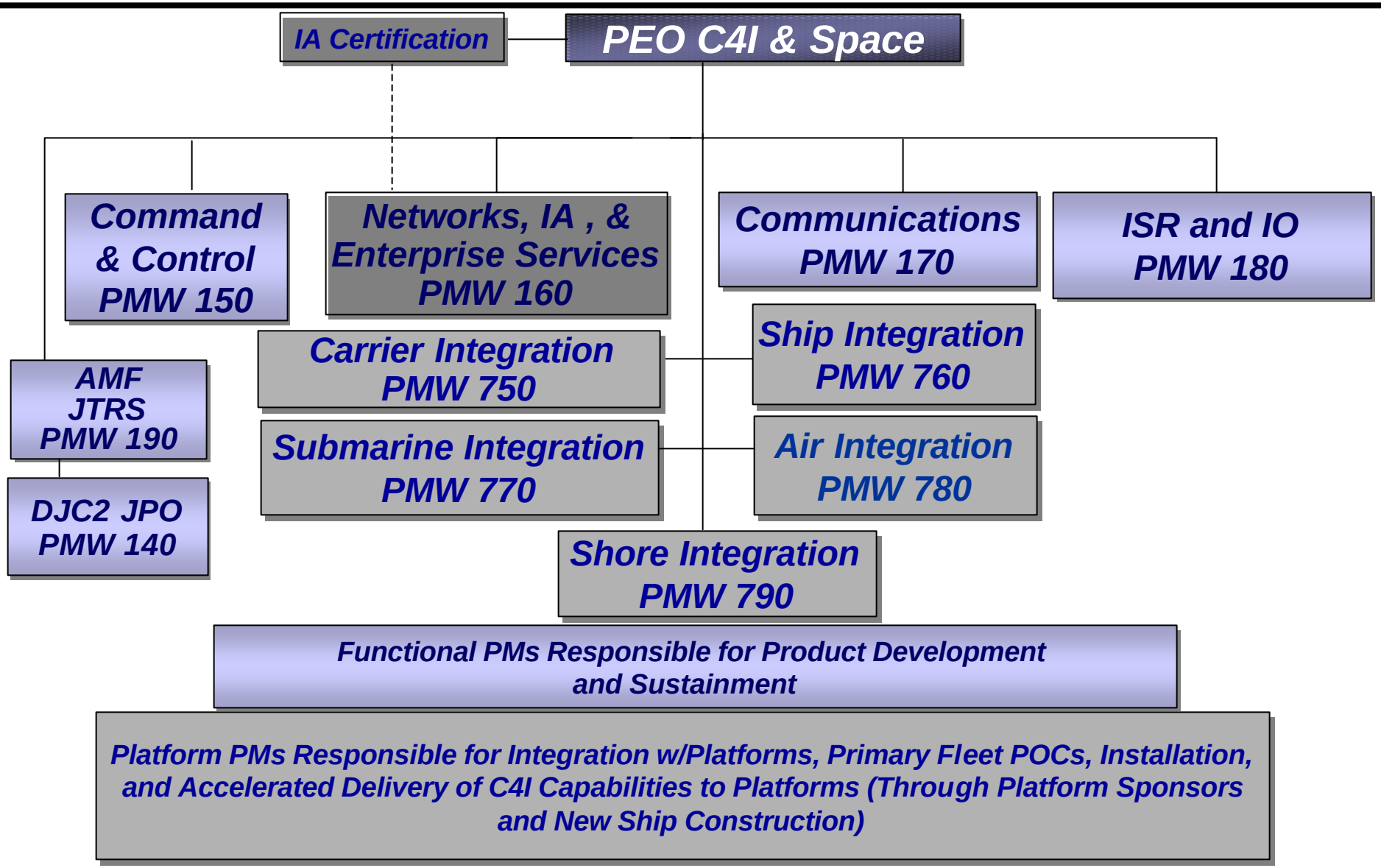
PMW 160

Networks, Information Assurance & Enterprise Services

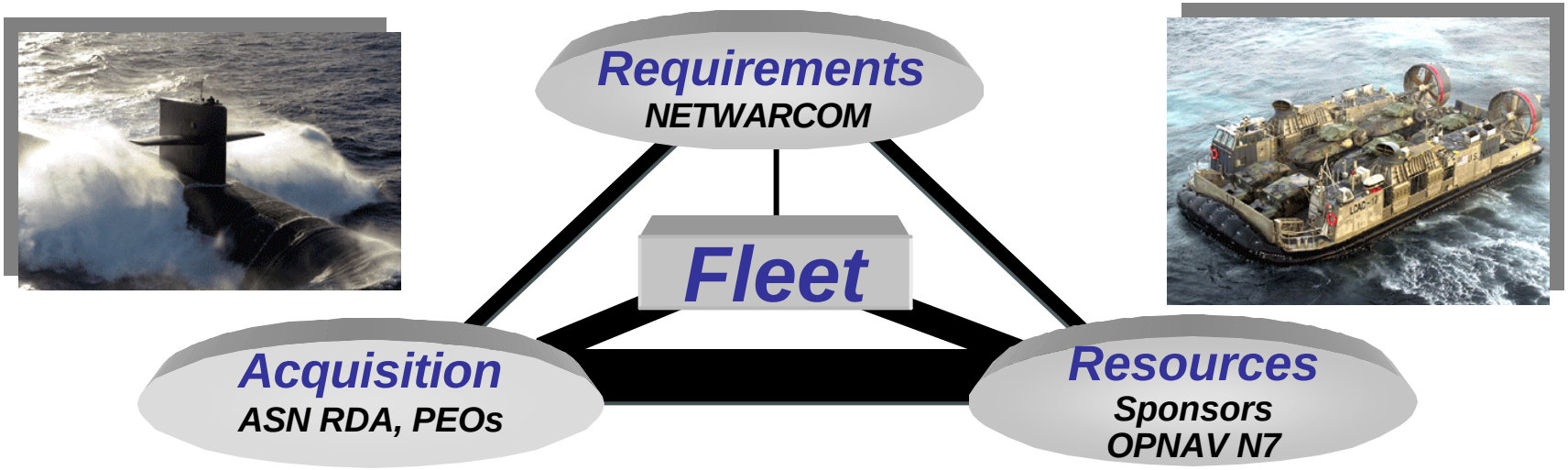
Overview for NDIA

Mr. Rob Wolborsky
Program Manager – PMW 160
Networks, IA, & Enterprise Services

PEO C4I & Space Organization



PEO C4I & Space
Integrated Roadmap as Community Tool



- PEO C4I Integrated Network-Centric Warfare Roadmap Facilitates Community Triangle to Synchronize Efforts
  - Assists Fleet in Prioritizing Requirements
  - Facilitates Educated Decisions by Sponsors to Defend Appropriate Resources
  - Guides Acquisition, Development, and Fielding, of Right Capability at Right Time

Turning Your Requirements Into Reality is Our Top Priority!

PMW 160
Evolution of the Organization

PMW 161
Information Assurance

PMW 165
Afloat Networks

PMW 166
Naval Messaging

ADNS
(PMW 179)

JCDX
(PMW 157)

PMW 160
Program/Project Alignment

PM
Mr. Rob Wolborsky

DPM
CAPT (sel) Bob Parker

Afloat Networks PMW 160-1	***CRYPTO & Key Mgt. PMW 160-2***	***Enterprise Services PMW 160-3***	***Network Security PMW 160-4***
ISNS	KG-3X	DMS	JCDX
ADNS	KG-40AR	Tactical Messaging	CND
SCI Networks	DMS Infosec CAW	NGDS	CDS
SubLAN	Crypto Products	NMCP	DII Guards
CENTRIXS-M	EKMS	COMPOSE	IA Readiness Services
VIXS	PKI	TDAMS	NMCI IA
Workstations (PCs)	Biometrics	Network Management	Radiant Mercury
	Secure Voice	NREMS	
	Crypto Mod	FSI	
	AWC		

Aligned to Develop and Field Capabilities!

PMW 160
Mission – Vision

- **Mission Statement**:
  - ***"We Are the Navy Acquisition and Technical Authority for Networks, Information Assurance, and Enterprise Services. We Provide Affordable, Interoperable, and Secure Net-Centric Enterprise Capabilities to the Navy, Joint, and Coalition Warfighters."***
- ***Vision Statement:***
  - ***"We Will Deliver Information Superiority to the Warfighter Through Integrated Net-Centric Enterprise and Seamless Information Assurance Services."***

PEO C4I & Space
C4I Operational Capability

IT21 Limitations

- Bandwidth Constrained
- Stovepiped Systems
- Inefficient Use of Resources
- Little Redundancy
- Multiple Enclave and Application Specific Networks
- Isolated Coalition Enclaves
- Stovepipe Raw Data Streams to Operator
- Inconsistent Data Quality Across Information, Sensor and Engagement Networks

Integrated Roadmap

NCW Objectives

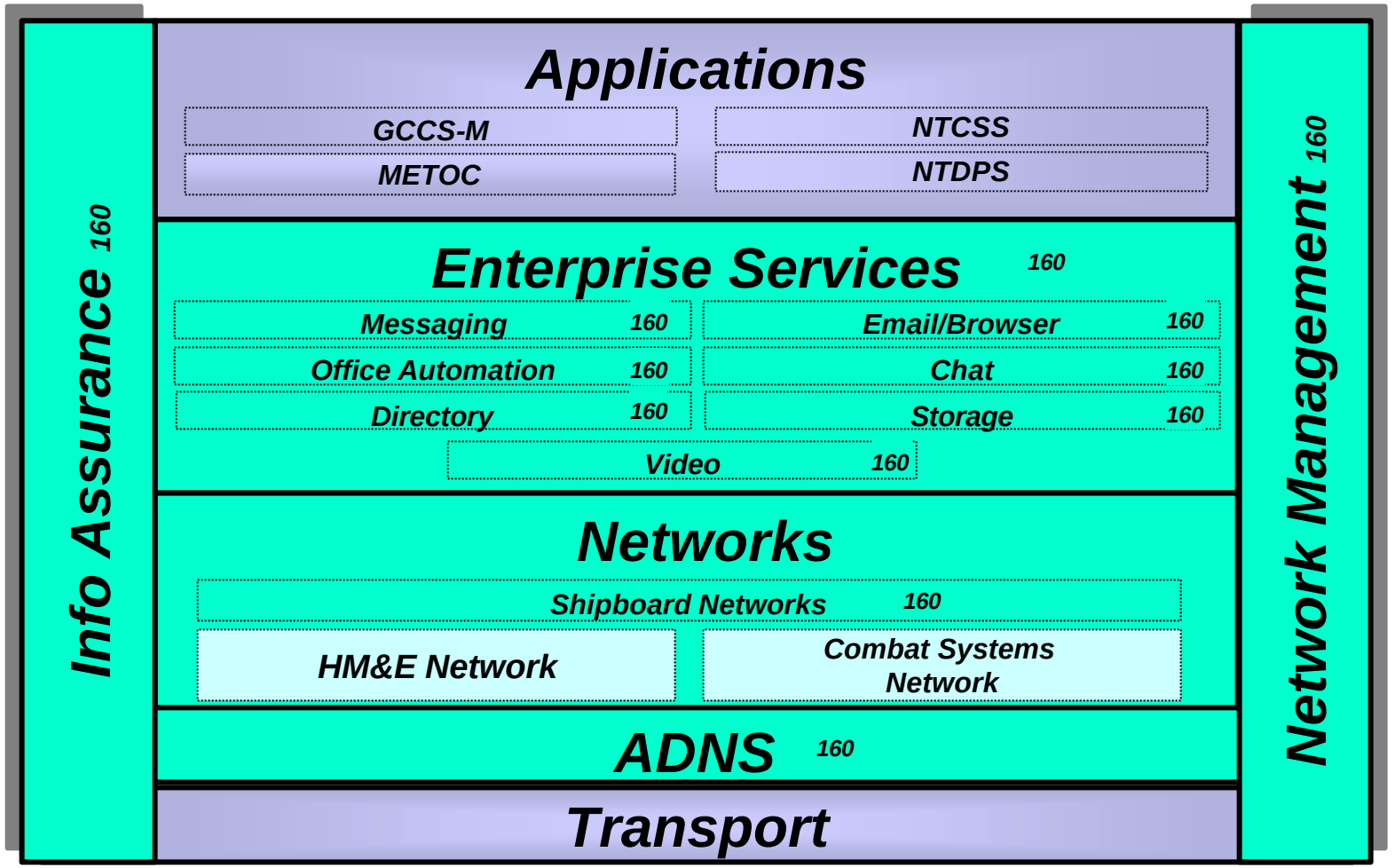
- Remove Bandwidth as Capability Limit
- Multi-Path Transport
- Dynamic Bandwidth Management
- Redundant Paths
- Merged Networks
- Multi-National Information Sharing

PMW 160

- Information Provided to Operator is Relevant, Timely, Accurate, and Usable

Networks, IA, and Enterprise Services,
Driven By Commercial Marketplace (State of the Art)!

PEO C4I & Space
Overarching Afloat Framework



PMW 160 Responsible For Majority of Navy Afloat C4I Architecture

Fleet Top Ten

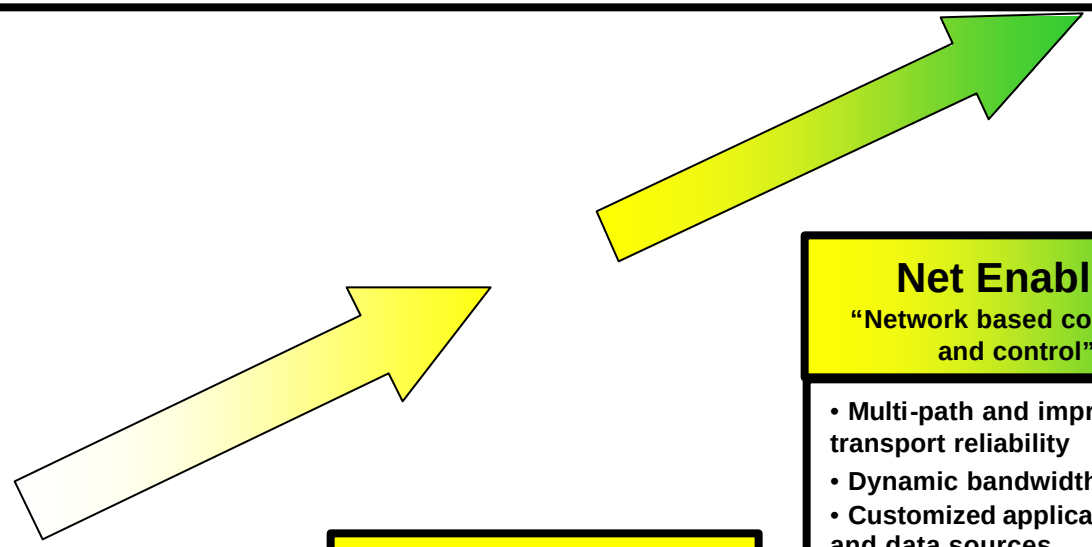
FY-05 Numbered Fleet N6 Top Ten Requirements

1. Improved High Data Rate Throughput	PMW 160
2. Improved Standards Throughout C4I Community	ALL
3. Coalition Communications	PMW 160
4. Antenna Capability and Reliability	PMW 170
5. Data Link Enhancements	PMW 150
6. Computer Network Defense	PMW 160
7. Multi-Level Security/Cross-Domain Solutions	PMW 160
8. Real-Time Collaboration/Next Gen KM	PMW 150
9. Network Life-Cycle Management	PMW 160
10. ISRT Applications	PMW 180

FY-06 Numbered Fleet N6 Top Ten Requirements

1.	COALITION COMMUNICATIONS	*PMW 160*
2.	360 DEGREES RELIABLE ANTENNA	*PMW 170*
3.	IMPROVED STANDARDS THROUGHOUT C4I COMMUNITY	*ALL*
4.	IMPROVED HIGH DATA RATE THROUGHPUT	*PMW 160*
5.	COMPUTER NETWORK DEFENSE	*PMW 160*
6.	Common Operational Picture	*PMW 150*
7.	REAL-TIME COLLABORATION	*PMW 150*
8.	IMPROVE FLEXIBILITY AND OPERATIONS OF THE NETWORK THROUGH WIRELESS TECHNOLOGIES	*PMW 160*
9.	NEXT GENERATION KNOWLEDGE MANAGEMENT (KM)	*PMW 150*
10.	NETWORK LIFE CYCLE MANAGEMENT	*PMW 160*

Capability Stepping Stones to FORCEnet



Full IT21
"Online"

- IP Reach Back
- Local Area Networks
- Wideband Receive
- RF Management
- Survivable comms

Level 0

Today

Net Connected
"Improved decision making"

- Web-based services
- Improved network reliability and performance
- Increased bandwidth
- Improved coalition operations and data sharing
- Tailorable situational awareness tools
- Standardized data exchange between domains
- Defense in depth

Level 1

FY07

Net Enabled
"Network based command and control"

- Multi-path and improved transport reliability
- Dynamic bandwidth mgmt
- Customized applications and data sources
- Common infrastructure and data exchange standards
- Improved data exchange across domains
- Enterprise management for asset analysis and repair
- Initial knowledge management and automated decision aids
- Assured sharing
- Distributed command and control operations
- Modular and open architecture

Level 2

FY10

Fully Net Ready
"Decision-making under undesirable conditions"

- Robust, reliable communication to all nodes
- Reliable, accurate and timely information on friendly, environmental, neutral and hostile units
- Storage and retrieval of authoritative data sources
- Robust knowledge management capability with direct access ability to raw data
- User-defined and shareable SA
- Distributed and collaborative command and control
- Automated decision aids to enhance decision making
- Information assurance
- Seamless cross-domain access and data exchange.
- Interoperability across all domains and agencies
- Autonomous and disconnected operations
- Automatic and adaptive diagnostic and repair
- Modular architecture to expedite new capabilities

Level 3

FY14

Capability Stepping Stones to FORCEnet

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Level 1 - FY07

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- Survivable comms

between domains
- Defense in depth

Level 3

Fleet Priorities = PEO C4I Priorities

Today

FY14

Network Consolidation

Network Consolidation

- **Today**
  - **Up to 50 separate networks on an individual ship**
  - **Multiple classes of networks – varying levels of convergence and commonality, and interoperability**
  - **Physically separate security enclaves (MLS Solutions not widespread)**
  - **Legacy internal comms / separate voice networks (POTS/PBX, Hydra)**
- **Need a FORCEnet approach to address potential consolidation of shipboard networks.**

Hypothesis

- ***Proliferation of Networks on Surface Ships Exists.***

  Initial surveys show upwards of 40-50 different LANs

- ***Proliferation is Technically Unnecessary***

  Industry has shown that consolidation and simplification of the network brings both efficiencies and cost savings

- ***Proliferation causes Increased Resource Demands***

  At a minimum, it becomes a CM nightmare, reality is duplicate efforts and added costs

- ***FORCEnet needs a homogeneous network environment***

  This is not achievable if the networks aren't connected to one another, the bridging consistent, and QoS defined

Minimize network E2E TCO & maximize interoperability for Fn, BSN, GIG

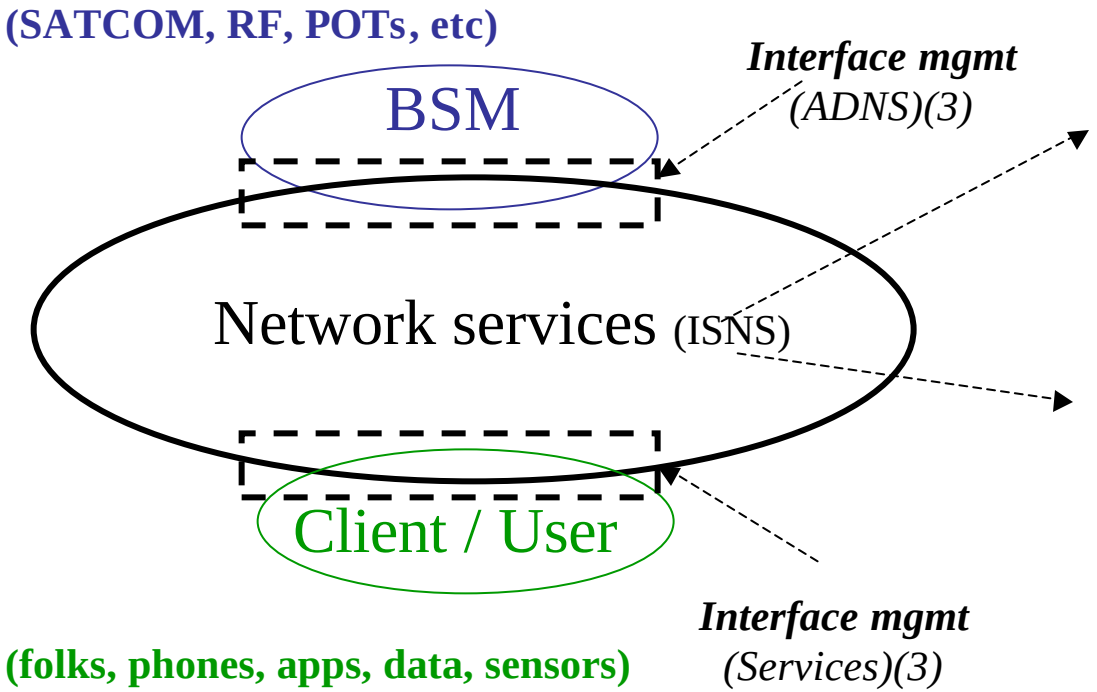
Industry Trends

- Convergence
- Embraces Heterogeneity – Leveraging Existing "Investments" rather than "Rip and Replace."
- Simplification to Reduce Complexity and Risk
- Application Oriented Networking – a Paradigm Shift

Commercial Topologies support multiple functions and networks, logically separated on a single physical network

Network Consolidation (NC)

NC = Network services + Systems management
Network services (NS) = service level offerings + SLAs
System management (SM) = Interfaces, reqs, Pgm Mgmt, ETC!



(1) Stds: HW, SW, LCS/CM, RAM, Metrics, protocols, ETC! (e.g., IT is a commodity)

(2) "CLINS" & SLAs: Quantify each network req into capability "buckets" and performance levels (e.g., CS, C4I, HM&E, & admin, also classification levels, etc)

(3) "System management "includes ALL other NC support!

CHALLENGES

STRATEGY

- Must have an overarching PMW 160 Approach/Vision
- Refine is the core objective(s) - then architecture can follow!

CONOPS

- Given a formal overall 160 strategy – embody it in a process
- IT/network governance must be spelled out – alliances formed
- Coc/R&R/ROE/etc also need to be clearly defined somewhere

ISSUES FRAMED

- Common list of critical issues, concerns and limitations
- E2E routing/QoS, black core, IPv6, governance, HAIPE, ETC…

COMMITMENT

- Make coordinating/resourcing NC a priority – a win-win overall

Recommendations

- Embrace NC and organize 160 roadmap around it
  - ISNS focused, major interfaces managed by ADNS & services
- Conduct a network survey to provide DATA
  - Specific data need to justify NC and the “set-up” resources
- Charter a Network Systems Engineering Team
  - Engage the Fn/C4I Virtual SYSCOM and all PMW Chief Engineers
  - Then expand back into a “NIIN” IPT/ WG
- Key Deliverables
  - Network IPT charter and objectives (& leadership support)
  - Business Case study covering forward/back fit and mission critical impact (survey and report)
  - Integrate ALL C4I /network Roadmaps, finalize PMW 160’s part
  - Finesse and approve NC position paper and way forward

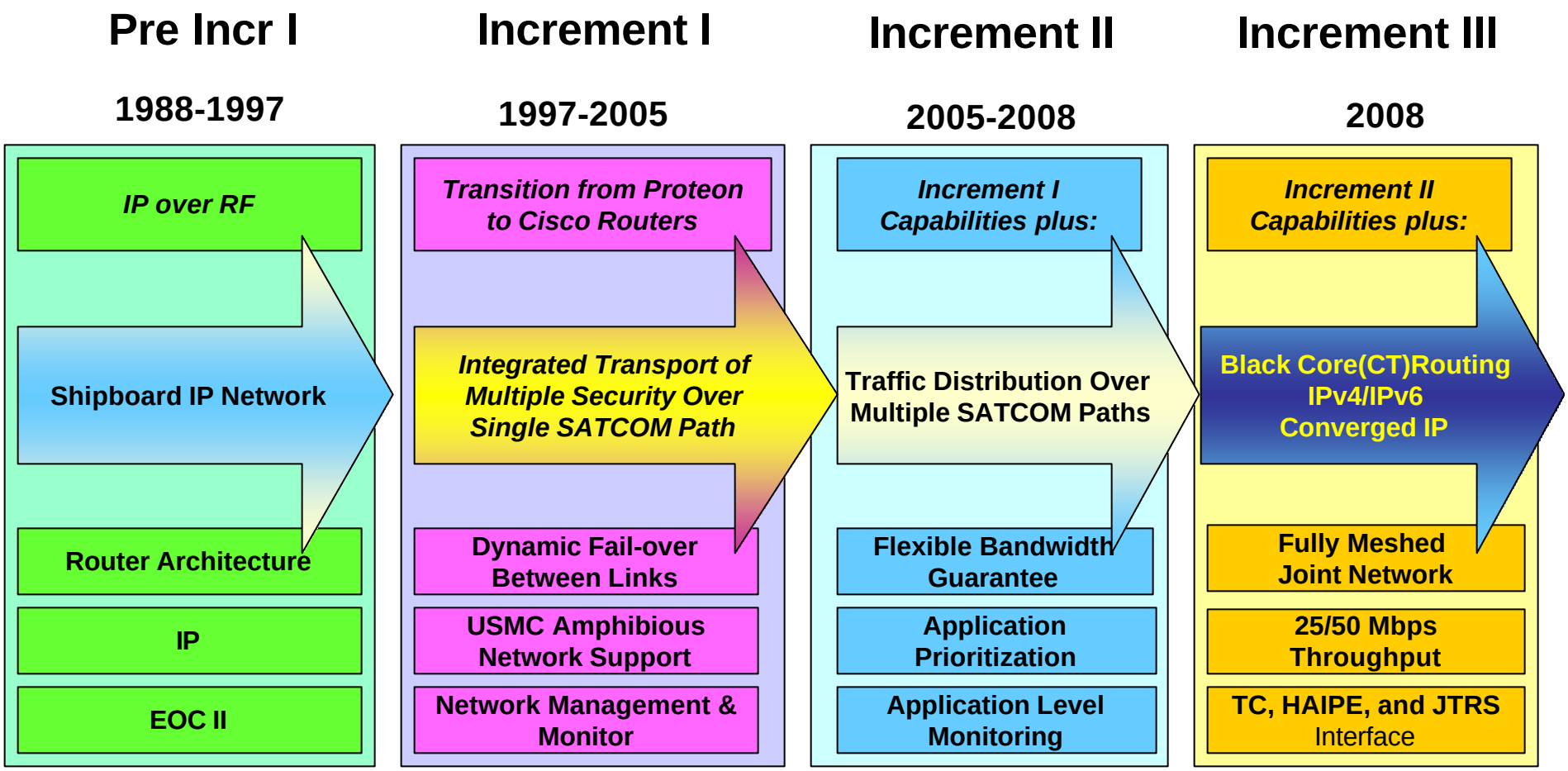
ADNS

ADNS Today and Tomorrow

- **Today's NAVY WAN:**
  - Single Path Access, No Restoral, Best Effort, Limited BW, No Guarantees
  - No Network “Insight”, Little Visibility, Limited Decision Making Tools
- **The NAVY’s Future WAN will be:**
  - Bandwidth Efficient, Possess Multiple Survivable Paths, Contain Quality of Service Guarantee’s and Provide Network Visibility to Remote/Local Users.
- **PMW 160 Challenge is to Provide the Fleet a Means to Use Bandwidth More Efficiently.**

ADNS is the NAVY’s POR for WAN Networking and The Mechanism to Accomplish this Vision

ADNS Increments



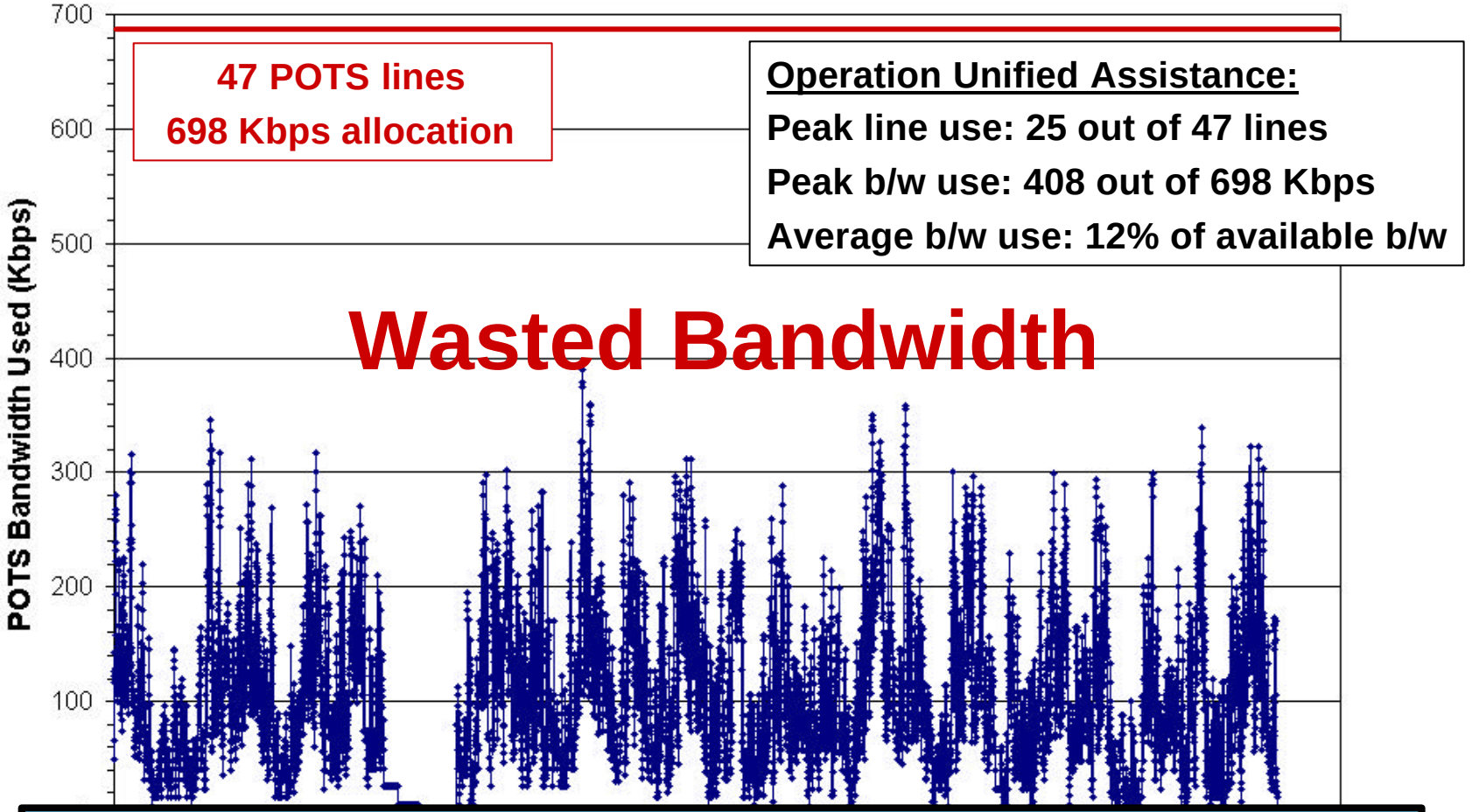
Increment I ADNS Provides:

- Limited Bandwidth
  - 512 or 768 IP Kbps to a US Navy [illegible] carrier
  - 128 IP Kbps to a DDG/CG
  - 32 IP Kbps (Shared)
- Afloat Units Maintain [illegible] to Maximize IP Connectivity (Single [illegible])
- Ships Limit Capabili[illegible] to Maximize IP Capability – Legacy I[illegible]mplementation
- Network Performance Issues Isolated via Manual Voice Circuits Subject to Operator Intervention

High Speed Internet Provides T1 to a Single Residence

INCREMENT I Solved 1998 Issues, Now Obsolete

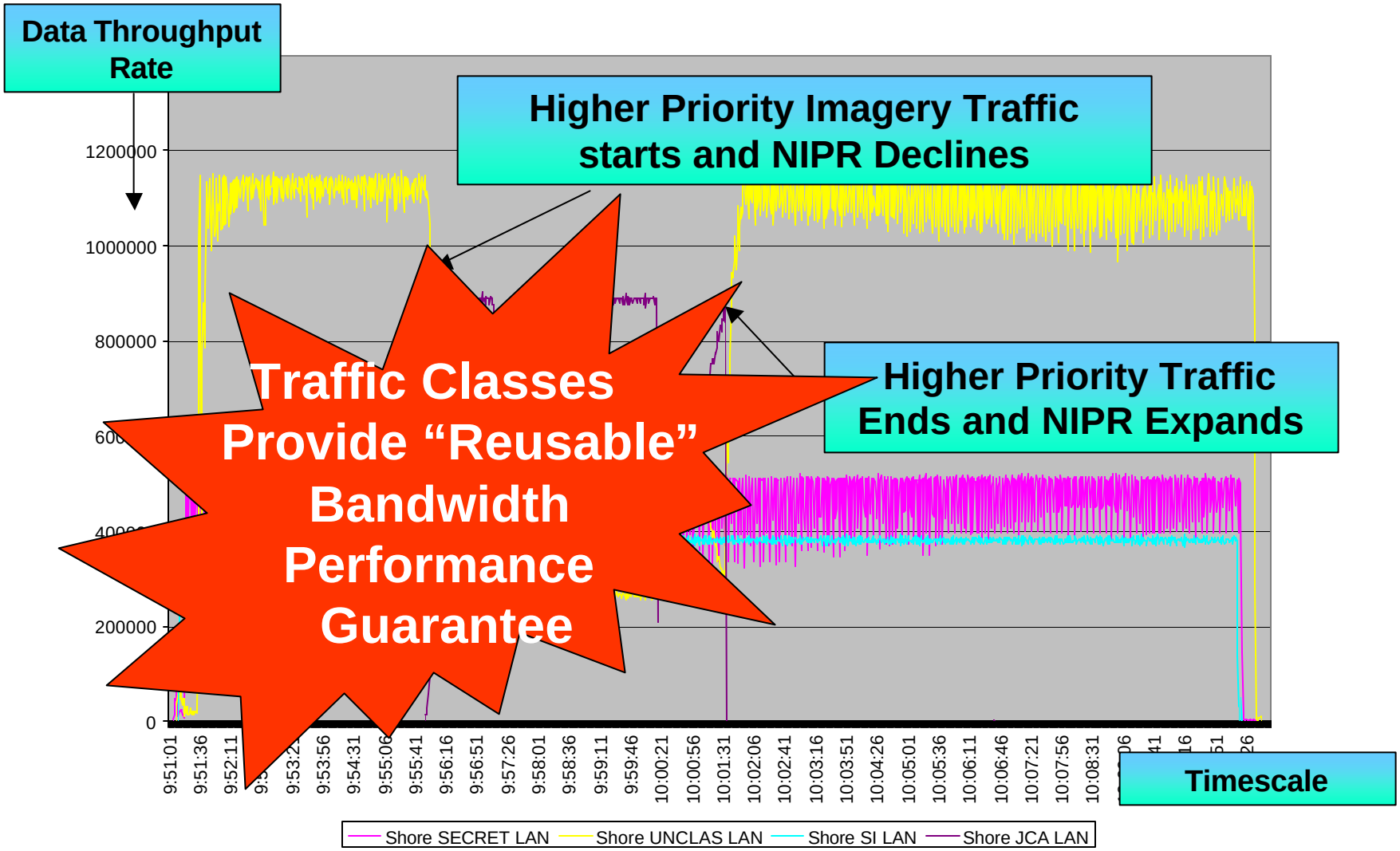
Increment I Typical POTS Use



Voice is not the Only Culprit – Serial Data and VTC Circuits Consume Major Portions of Static BW

Increment II BW Guarantees

JCA & Unclass via CWSP (1024 kbps)
Secret via DSCS (512 kbps), SI via EHF (384 kbps)

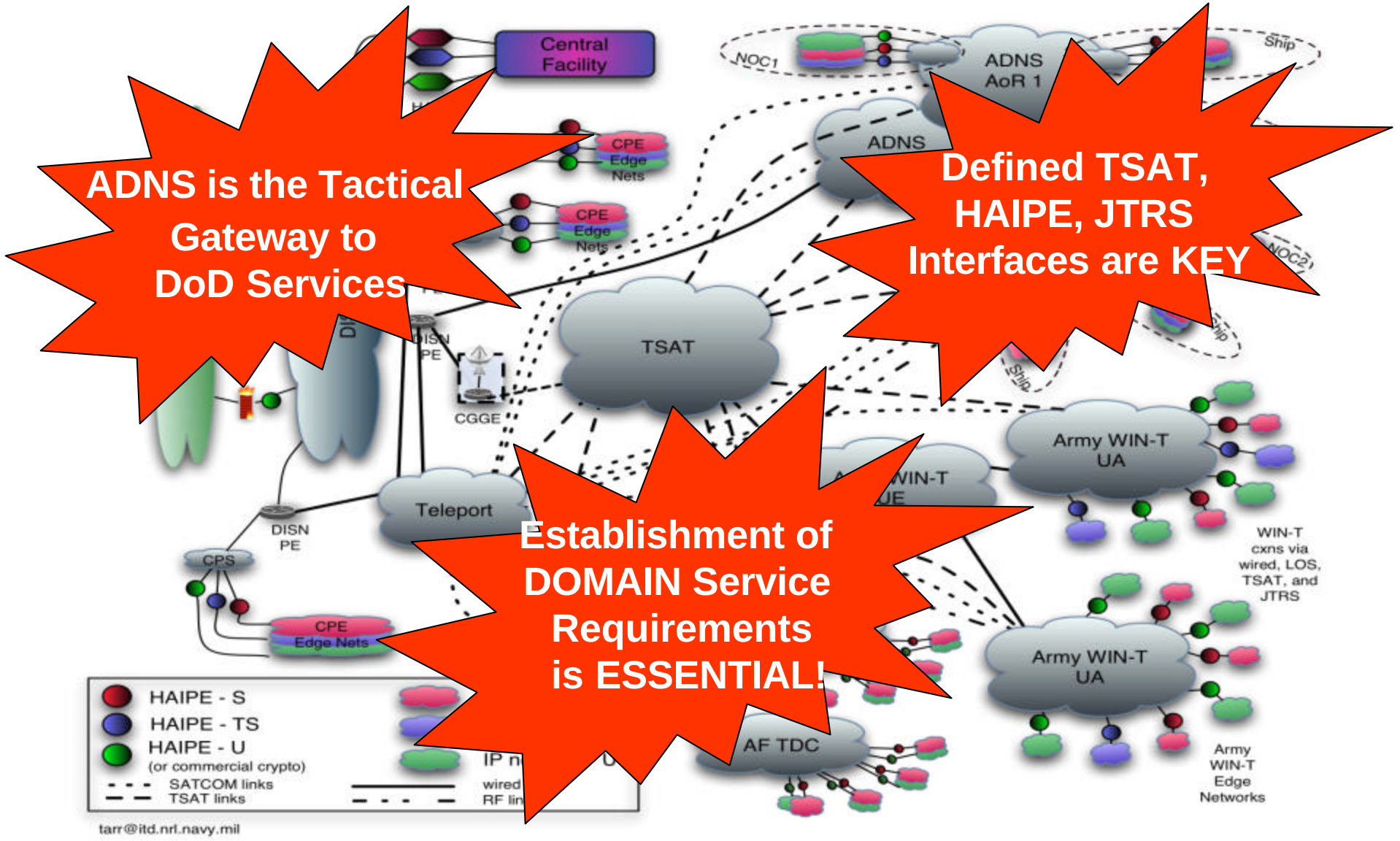


ADNS Inc III Capabilities

– **Future Increment III Systems will support:**

- 25/50 Mbps Tactical Throughput Capability
- A Fully Meshed Network
- Support for Real Time Mission Critical Applications requiring increased factors of Network Reliability and Availability
- Network Capable of Supporting both IPv4 and IPv6 Applications
- Support for Dynamic QOS and Dynamic Bandwidth Allocation
- Support for Mobile Ad Hoc networking
- Support for Multi-Cast Applications
- Align with the Navy Tactical WAN with the DoD GIG across a Black Core Backbone

Notional View of Incr III GIG IP Connectivity



Summary

ADNS is the Tactical Navy "Gateway" to the GIG

Interaction Between the ADNS "Domain" and Other Domain Users is Key to Architectural Development

FORCEnet Services Infrastructure (FSI)

Overview

Goal: *FORCEnet Services Infrastructure (FSI) shall provide the next generation information systems, providing robust, non-proprietary mechanisms to:*

1) dynamically add content, sensors, visualization clients and applications to the afloat C2 network, and

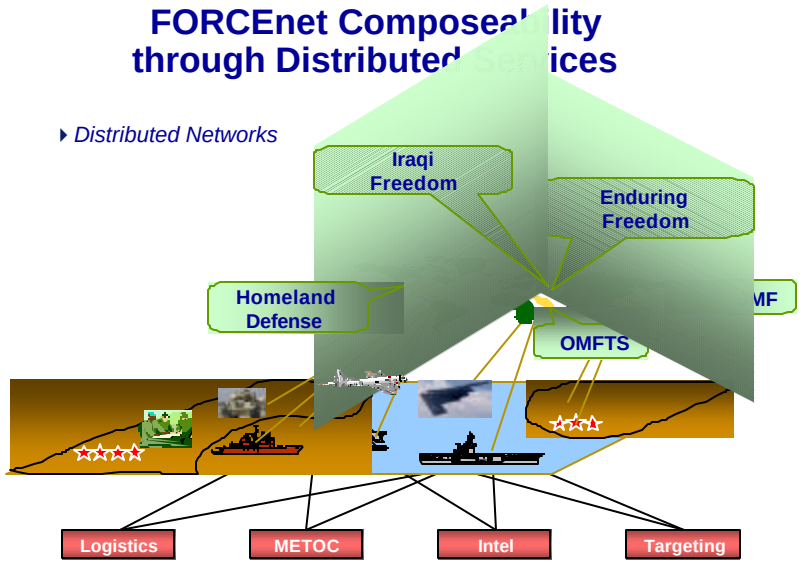
2) reduce redundancy by increasing information sharing by providing a single information/C2 system backbone for Navy nodes, compliant with DISA Core Services.

Motive: *Increase speed of command and reduce manning by facilitating an architecture that reduces the barrier of entry for new applications and sensors to better display, analyze and fuse C2 data to the warfighter.*

Shortening the Kill Chain

FSI Background

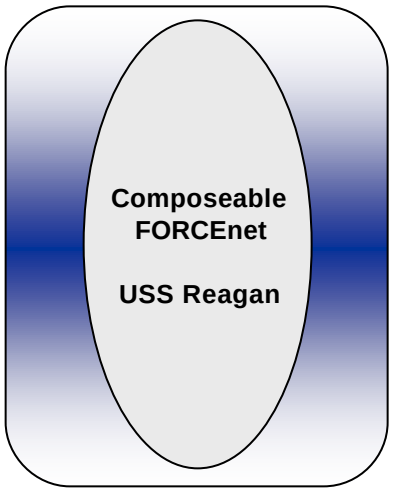
- **PR07:**
  - $58.1M RDT&E and $48.4M OPN programmed across the FYDP in support of:
    - Acquisition Documentation
    - Software engineering & developing
    - Integration Support
    - Test and Evaluation
    - SCI and ISNS
    - C4ISR Apps in SOA environment
    - Rack, server and storage & S/W OPN (P) & (I)
  - Not a “new start” – Will be implemented through existing PORs



FSI delivers the SOA environment to enable FORCEnet

FSI Initial Implementation Strategy

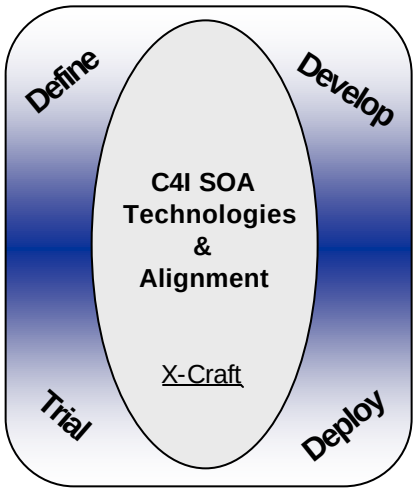
Today
FY05



Pre-Phase 0

- PEO C4I & Space, PEO IWS coordinated at-sea demonstration

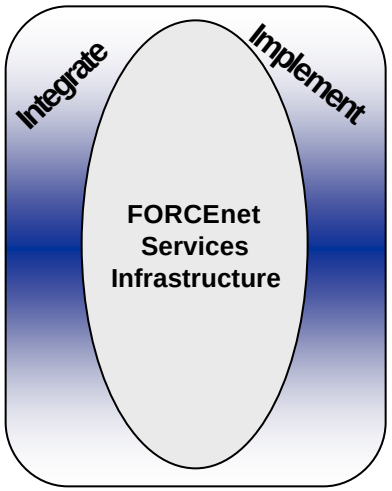
Near- term
FY05-06



FSI Phase 0/Phase 1

- Define C4I SOA services
- **Decompose** Major POR requirements
- Integrate SOA Cyber plumbing
  - Common Services
  - COI services

Mid- term
FY07-FY08



FSI Phase 2+

- Implement FSI with POR baselines
- Begin integration and alignment with NCES/DIB

Funding scheduled for FY07, but work needs to begin today

FSI Phase 0/1

Phase 0

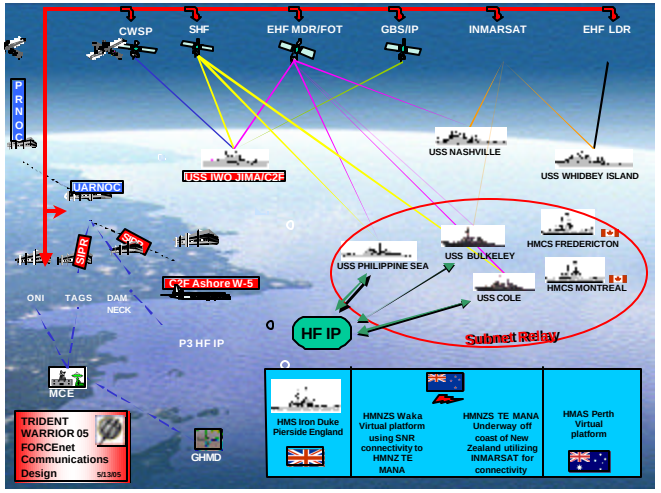
- Lab test of POR prototypes
- Leave behind FSI test bed
- Associated NESI guidance

NESI's purpose is to create a Net-Centric future using

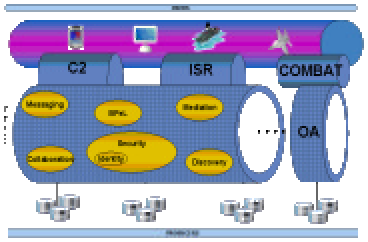
- **Guidance** – Provides measurable requirements and rationale for net-centricity
- **Best Practices** – Provides advice on net-centricity
- **Examples** – Demonstrates application of guidance and best practices net-centricity
- **Glossary** – Defines terms that are used in Guidance and Best Practices
- **References** – Provides further information about guidance, best practices and examples

Phase 1

- Sea Trial event (e.g. TW06)
- Discussion of thoughts



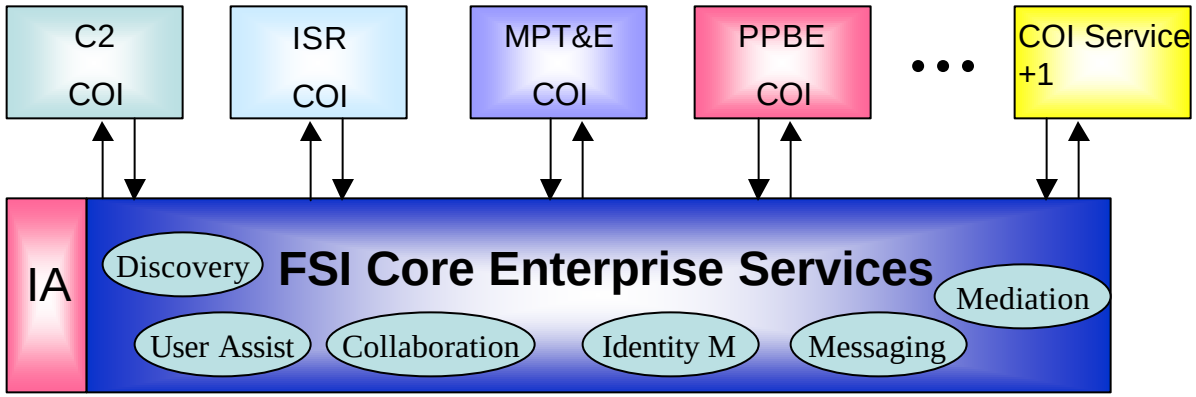
FORCEnet SOA



Demonstration Opportunities

X-Craft Trident Warrior Sea Trials

Expanding FSI
(FSI should cross SYSCOM/PEOs/PORs)



- **Next FORCEnet Engineering Conference**
  - **Present results FSI Phase 0 Test**
  - **Invite additional Communities of Interest to participate**
    - **Experiment with Plug and Play across COIs on FSI infrastructure**
    - **Utilize Fn Compliance Checklist, Fn Standards, best Practices (e.g NESI)**

In Order to Function, FSI Must Transcend the PEO C4I/SPAWAR Enterprise

Execution

- Leverage investments and schedule of existing programs of record (PORs)
  - METOC
  - GCCS-M / Composeable FORCEnet (CFn) - applications
  - ADNS
  - ISNS
  - NCSS (Naval Combat Support Systems)
  - SCI Networks
  - ONR Future Naval and Rapid Technology Transition programs
- Align acquisition documents across multiple PORs
  - JCIDS (ICD, CDD, CPD)
  - ISP (Information Support Plan)
  - SEP (Systems Engineering Plan)
  - TEMP (Test and Evaluation Master Plan)

Need to Define Current Technical Gaps, and Align the Solutions

FSI Way Ahead

- Nominate IPT leads
- Establish roles and responsibilities within PEO
- Define top level requirements/capabilities
- Develop FSI Architecture Document
- Draft MOA to align funding
- Draft Project Definition Document (PDD)
- Align with external stakeholders

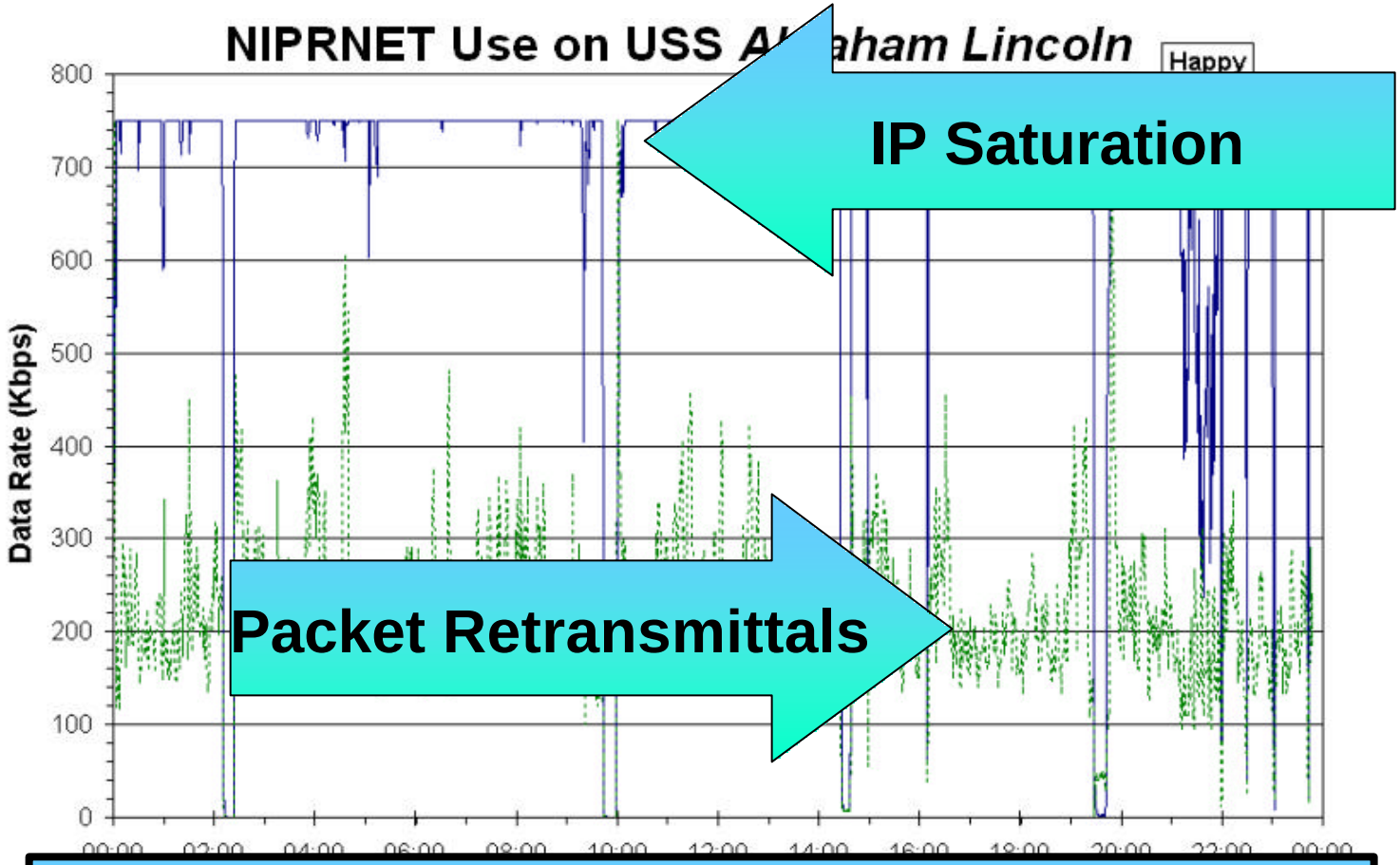
PMW 160 Summary

- Our Mission and Vision connect with the Fleet's requirements
- ADNS is Directly addressing a Fleet Priority
- Network Consolidation can provide the homogenous network environment for FORCEnet
- FSI delivers the SOA environment to enable FORCEnet
- *PMW 160 Responsible For Majority of Navy Afloat C4I Architecture*

I'M COUNTING ON INDUSTRY TO PROVIDE TECHNOLOGIES TO MEET THE WARFIGHTERS' REQUIREMENTS

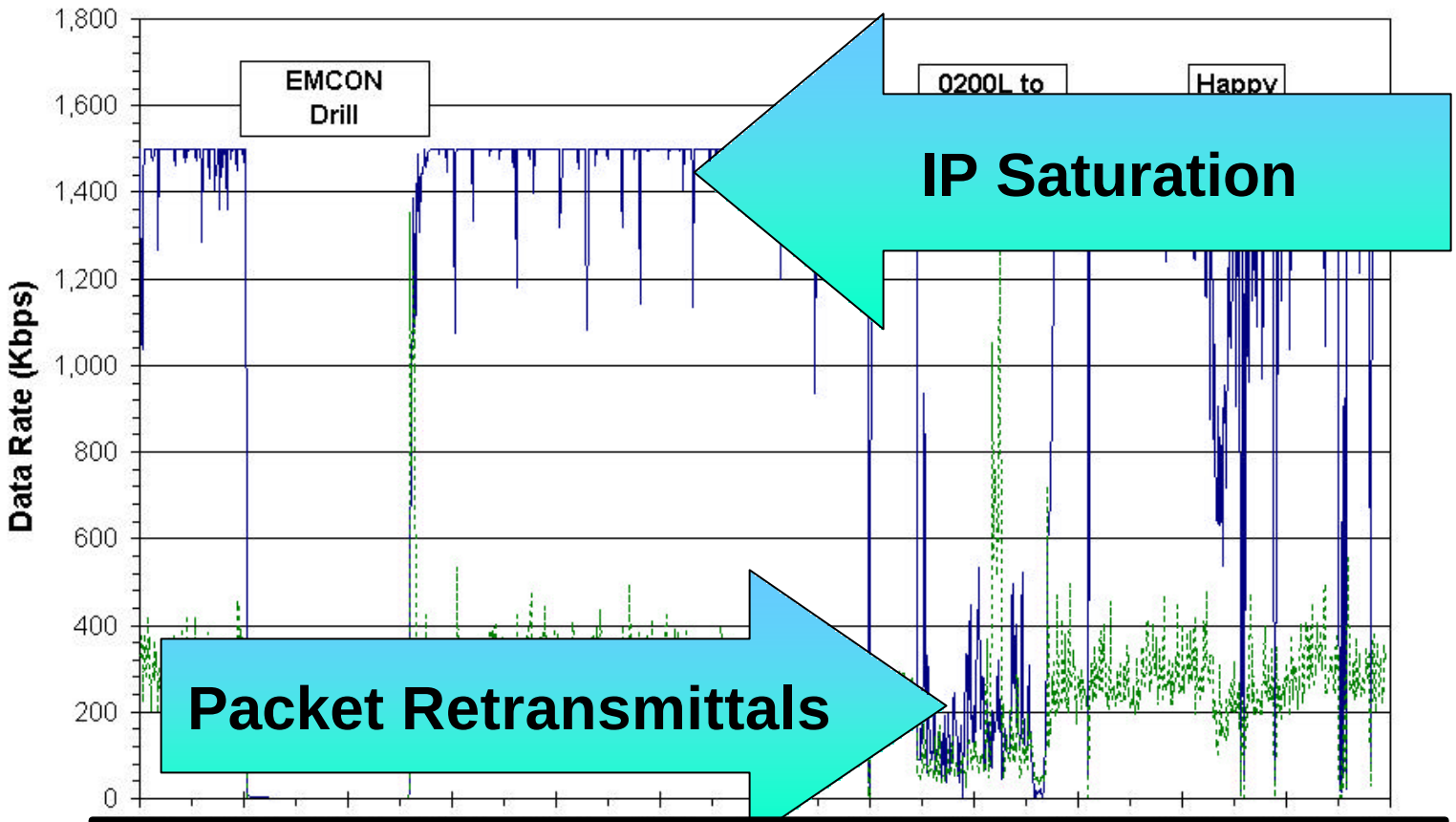
BACK UPS

Increment I NIPRNET BW: 768 Kbps allocation



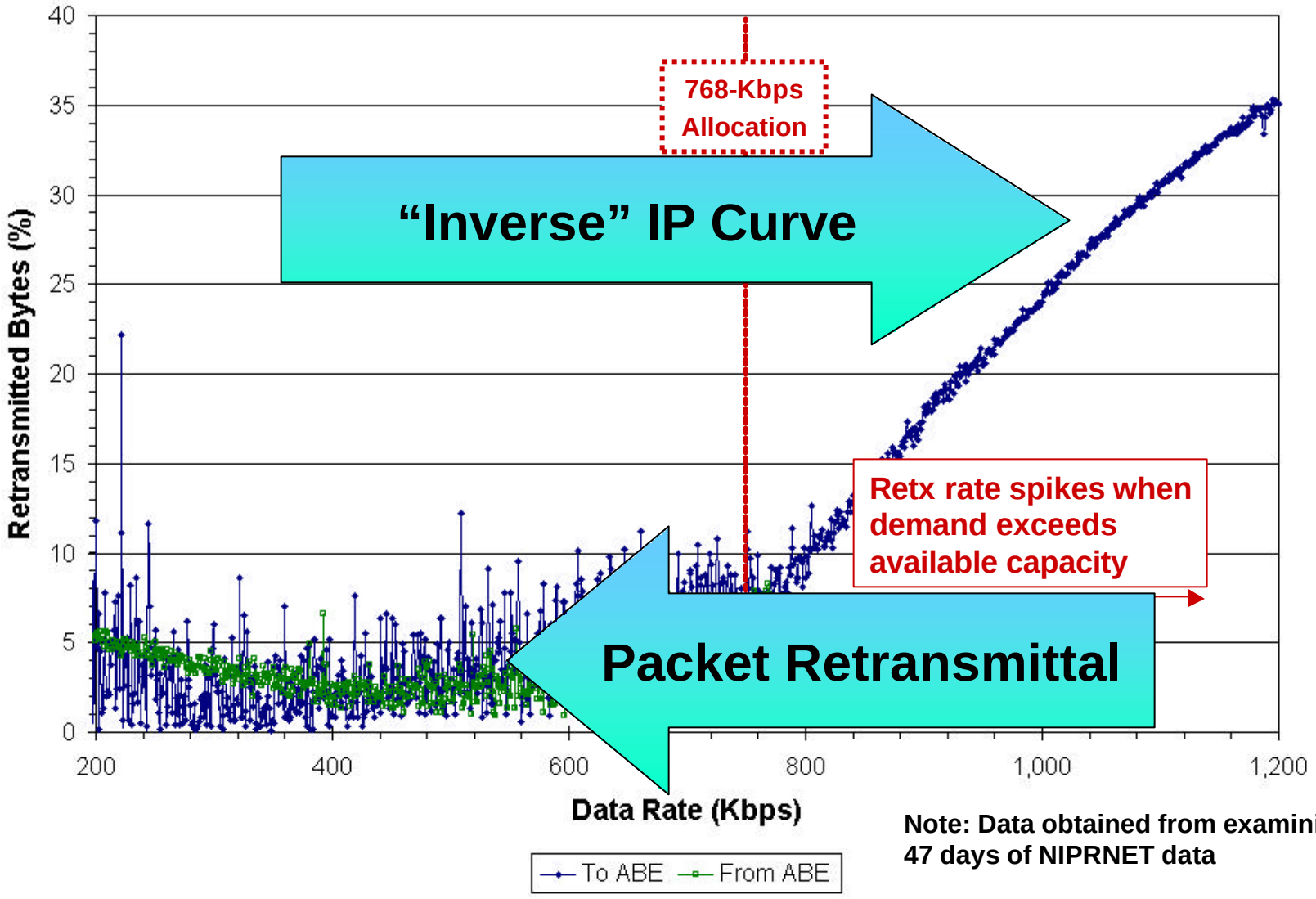
Increment I Does not Provide a BW Efficient Architecture

Incr I NIPRNET BW: 1,544 Kbps allocation



Increment I Does not Provide a BW Efficient Architecture

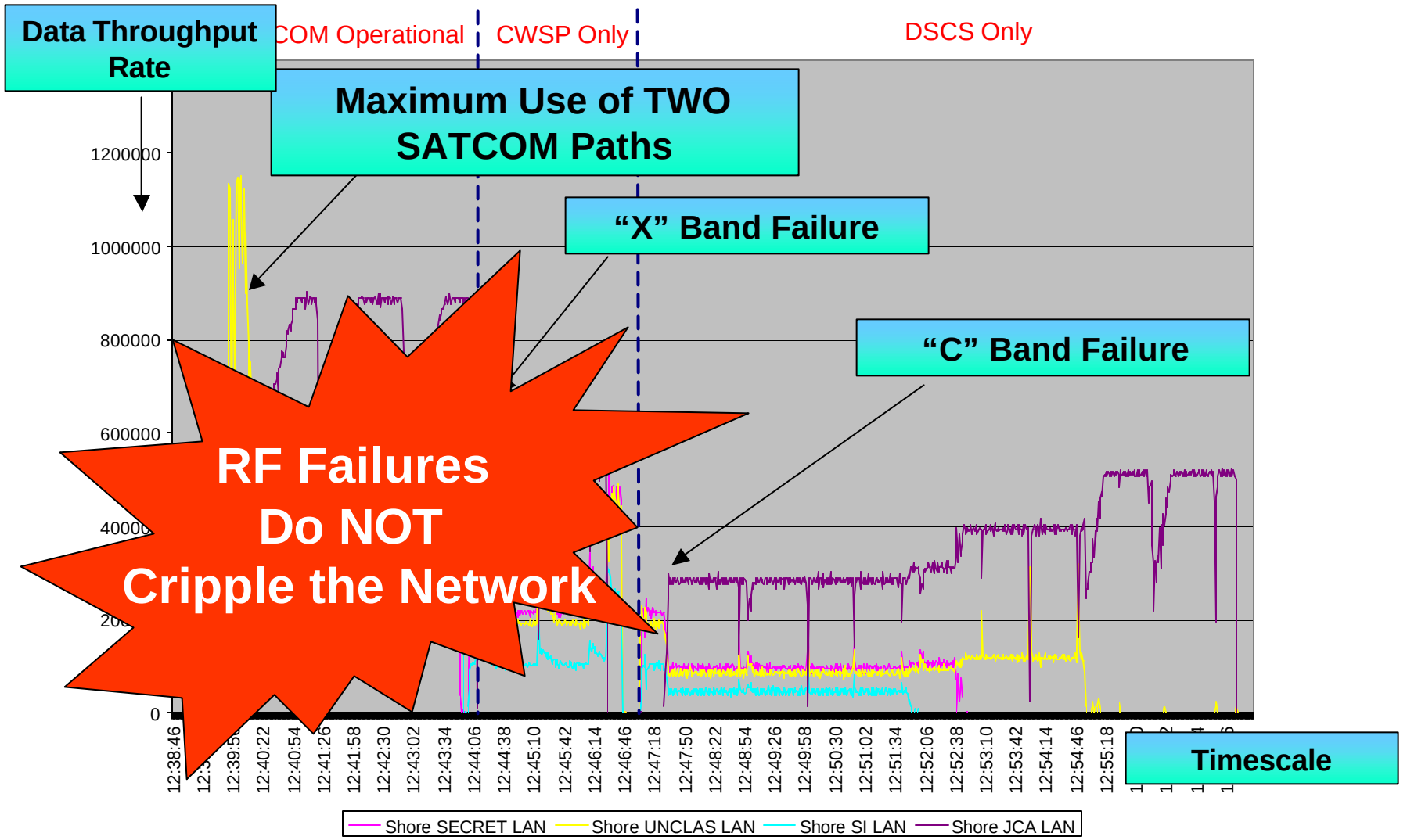
Increment I NIPRNET BW: Typical Shipboard Environment



Note: Data obtained from examining 47 days of NIPRNET data

Increment II Restoral

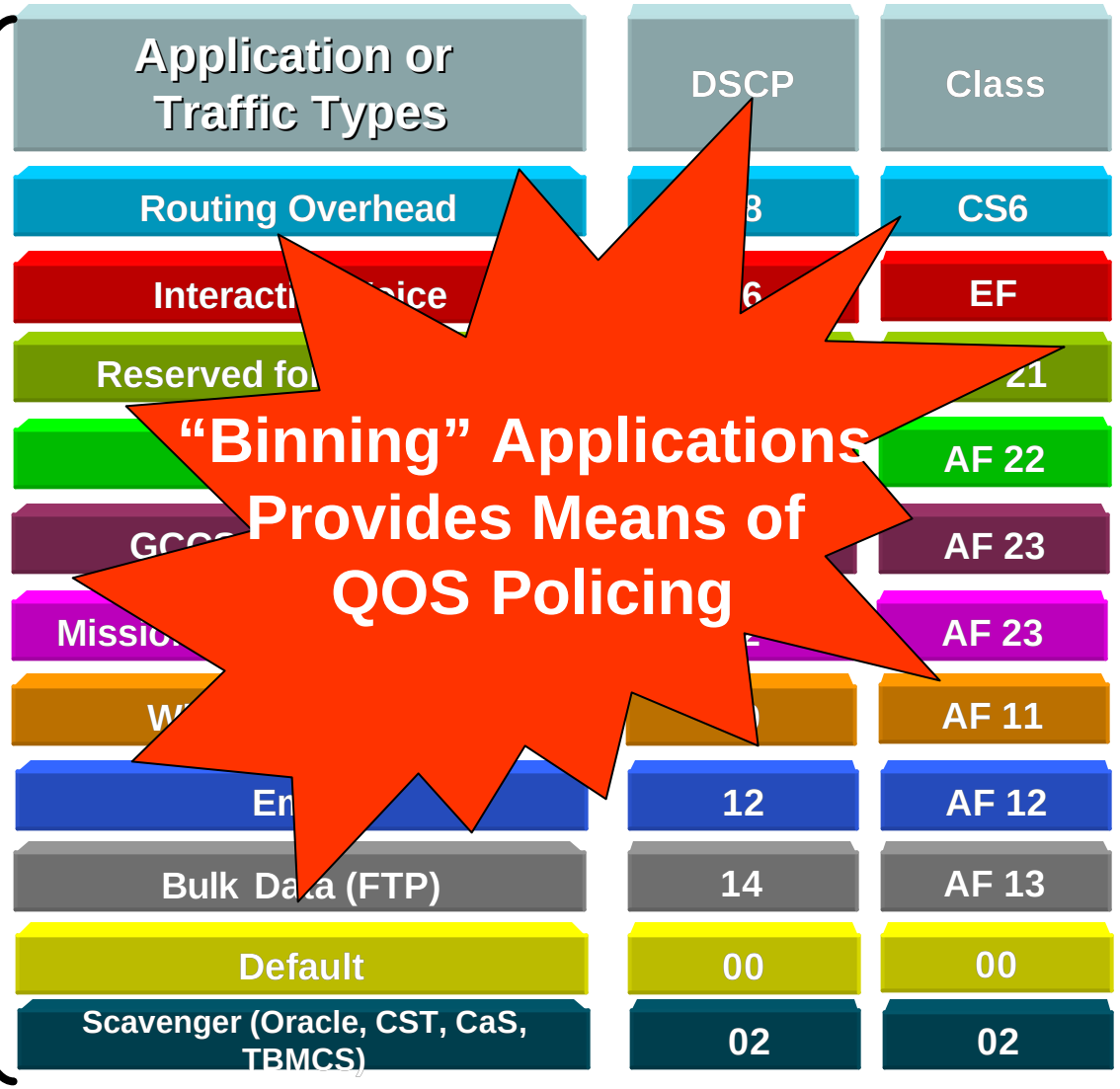
JCA & Unclass via CWSP (1024 kbps)
Secret (512 kbps) via DSCS, SI via EHF (384 kbps)



Increment II SIPR Application Prioritization

US NAVY Initial "True" QOS Implementation

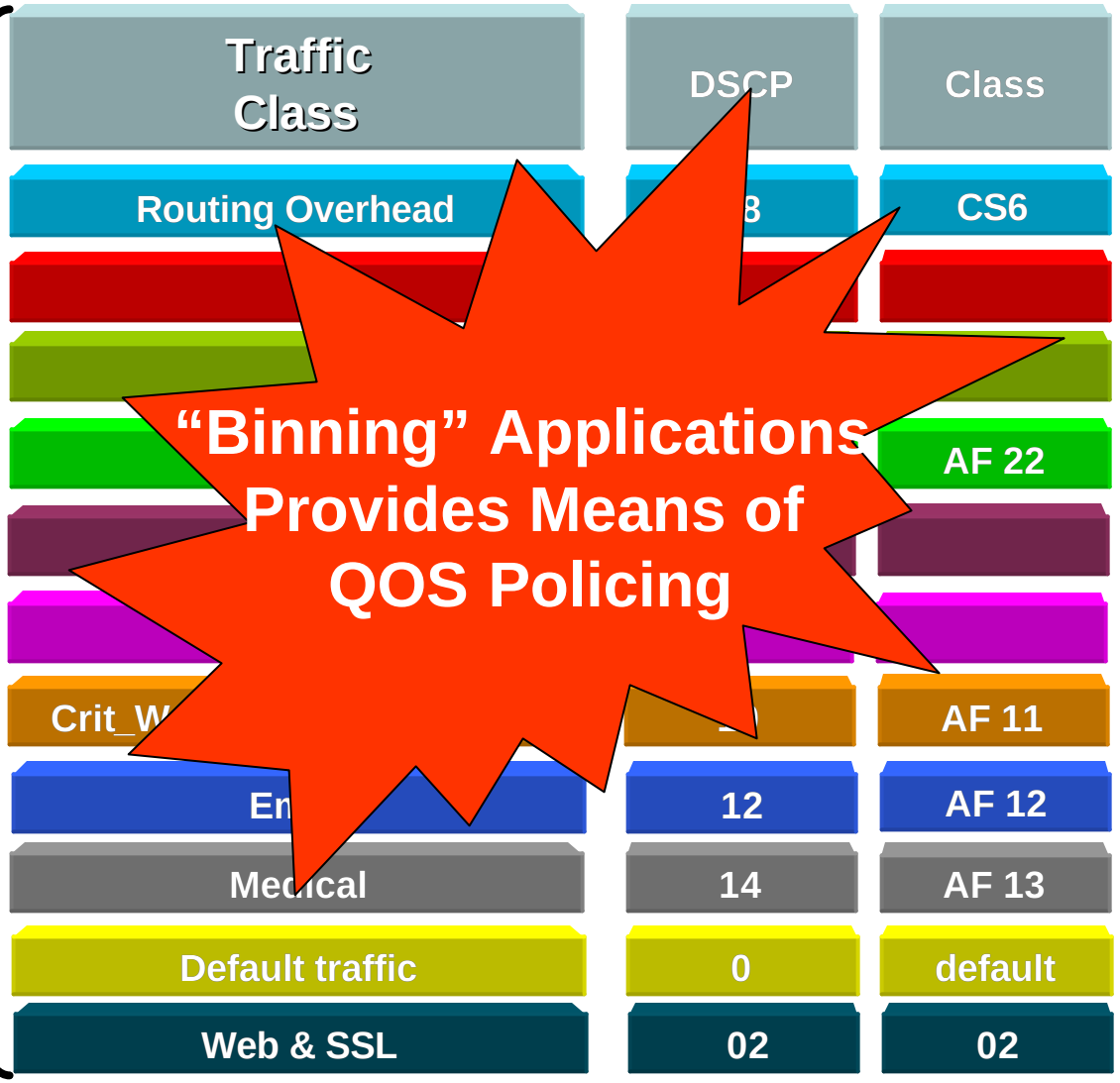
Determination of Priority is a "Warfighter" Input – CONOPS and DOCTRINE



Increment II NIPR Application Prioritization

QOS Must be ENFORCED at the POINT Of CONGESTION ADNS

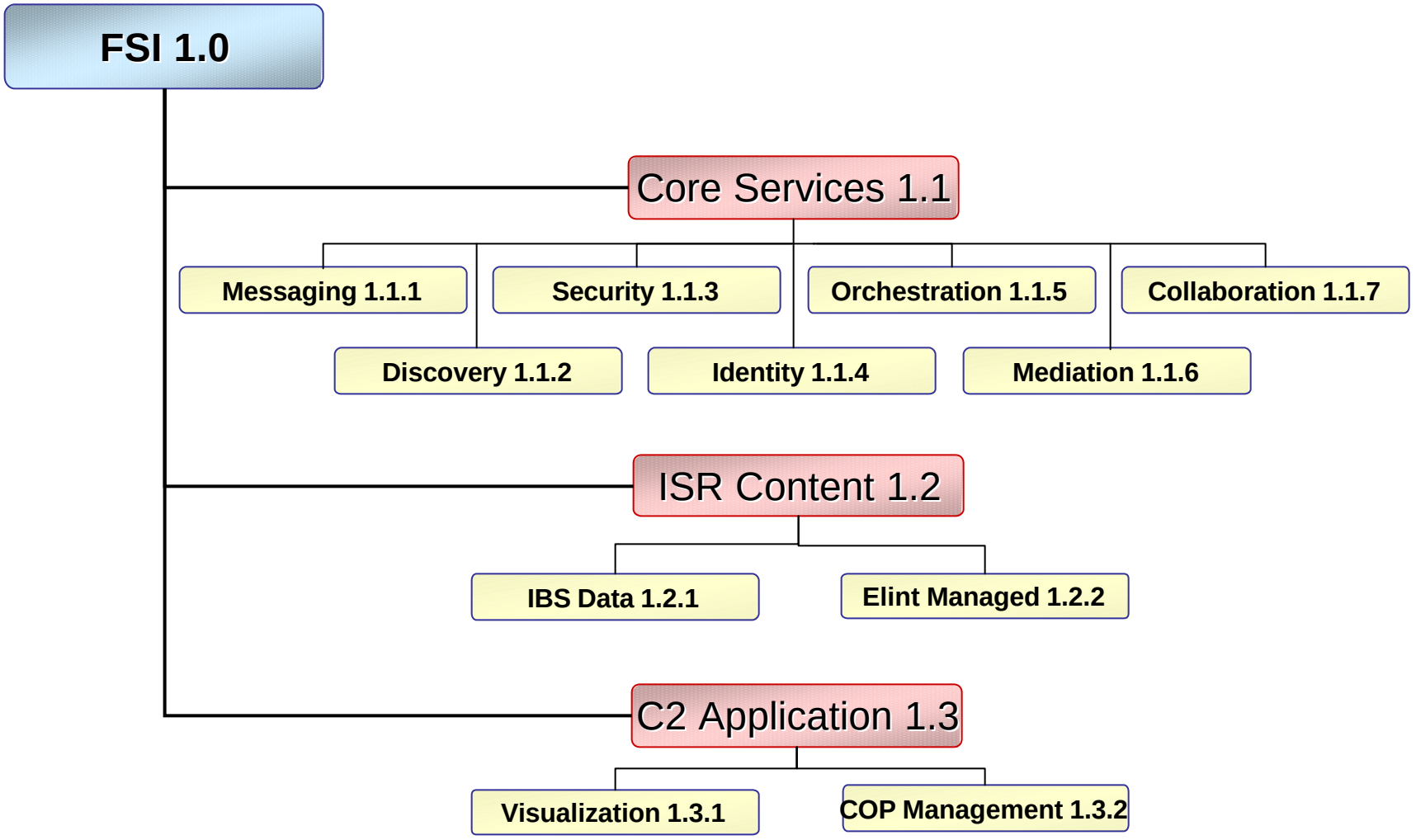
APPLICATION Characterization in terms of Duty Cycle, Surge Requirements, Jitter, Delay, Latency Requirements Must be Understood



External Working Group Participation

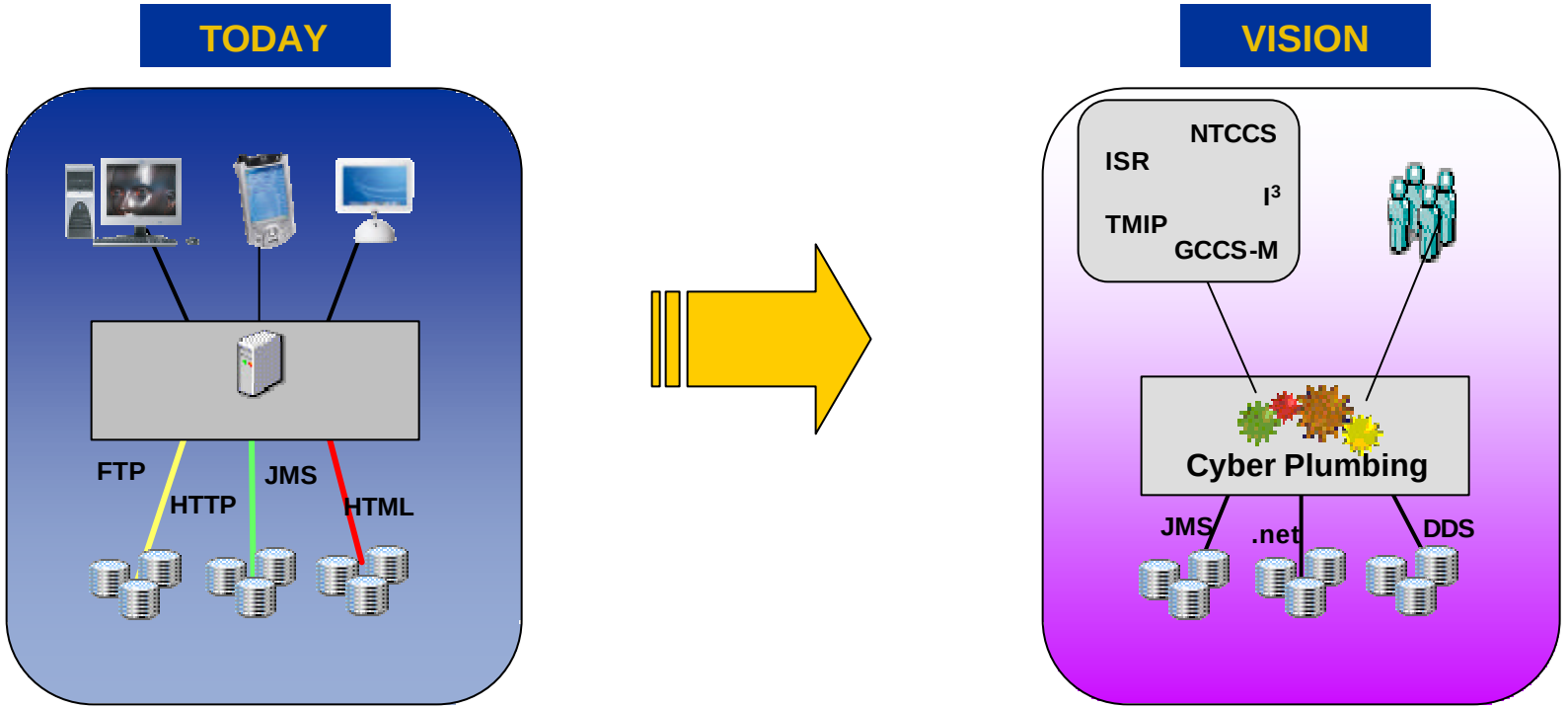
- Support the various DoD/DISA/Joint Working Groups. To name a few:
  - DoD GIG QOS WG
  - DoD VoIP IA WG
  - DoD E2E Systems Engineering WG
  - JNIPT (JTRS Joint Networking IP WG)
  - WIN-T ICWG
  - GIG Network Mgmt and Control (NeMAC) WG
  - GIG IA Transition Strategy WG
  - GIG Routing Working Group (GRWG)
  - TELEPORT AofA IPT WG's
  - ICWG (US Army)
  - HAIPE

FSI Phase 0 Focus



FSI Strategy

- Common framework for delivering C4I distributed services
- Combine existing efforts into a single implementation
  - Leverages previous S&T and industry investment
  - Prepares to align with NCES



Migrating towards web services

C2 COI Services Proposed Spirals

FY07 → FY08 → FY09

Spiral 1

- Add METOC COP Overlay capabilities
- Web-enabled METOC
- Adaptive Decision making and C2
- Improve BW efficiencies
- Technical review of Architecture hardware and software to work in a high volume environment
- Human Factors Evaluation

Spiral 2

- Automated Sensor prediction and workflow
- Enable editing of files posted on the COP, attach files to tracks
- Reconstruction and Analysis Tools
- Extend capabilities to JWICS echelons

Spiral 3

- Investigate additional FSI application for other warfare areas/missions: Surface Warfare, strike, mine warfare, missile defense, ISR and logistics

DRAFT

IPT Actions: Define Spirals

Based on message R 180750Z JUN 05 COMSEVENTHFLT UNCLAS

Network Consolidation (NC)

<u>System management</u> (SM) = Interfaces, reqs, Pgm Mgmt, ETC!
Any E2E service provider must include ALL other customer needs!!!

- Requirements traceability and management (coordinate as well)
- Environmental (HM&E spaces more hostile than C4I/combat)
- DOTMLPF (acquisition versus other stuff… quasi CAIV mind-set)
- WEB services and data stores – provide an enterprise aspect…
- Interface management (external and internal)(do this for the user!)
- NC Strategy – integrate RoI, capabilities map, LCS, etc into ONE
- Manage MOAs/MOUs (between SYSCOMs, PORs & CNO) & SLAs
- Accommodate LEGACY systems (VM ware, etc) and NEW items
- Certification and Accreditation support (both IA and WPNs)
- Customer relationships and communications … and.. ADVOCATE

NFC FY-06 Proposed Top Ten

C2F

1. Antenna Reliability
2. Coalition Communications
3. Data Throughput
4. COP
5. Real-Time Collaboration
6. CND
7. Network Life-Cycle Mgmt.
8. Standards
9. Next Generation KM
10. Streamlined Fielding Process

C3F

1. Data Throughput
2. Antenna Reliability
3. Coalition Communications
4. COP
5. Real-Time Collaboration
6. CND
7. ISRT
8. Standards
9. Next Generation KM
10. Multi-Level Thin Client

C5F

1. Coalition Communications
2. Antenna Reliability
3. Standards
4. Next Generation KM
5. CND
6. Real-Time Collaboration
7. Data Throughput
8. Network Life-Cycle Mgmt.
9. COP
10. Streamlined Fielding Process

C6F

1. Antenna Reliability
2. Coalition Communications
3. Data Throughput
4. COP
5. Real-Time Collaboration
6. CND
7. Network Life-Cycle Mgmt.
8. Standards
9. Next Generation KM
10. Streamlined Fielding Process

C7F

1. Coalition Communications
2. Standards
3. Antenna Reliability
4. Data Throughput
5. CND
6. Data Link Enhancements
7. Multi-Level Thin Client/CDS
8. Real-Time Collaboration
9. Network Life-Cycle Mgmt.
10. Streamlined Fielding Process

Fleet Issue: Coalition Communications

- FY-05 #3 Issue
- Effective Collaboration with Coalition Forces
- Cross Domain Solutions
- Use of Multi-Level Thin Client
- BFEM- Maintaining capability (PMW-170)

Challenges

- Published requirements
  - FLT CDRs, NWC, OPNAV, OSD or Joint Staff
- FY06 funding…or lack thereof
- Required Documentation
  - TLR, DODAF, JCIDS, ISP, CONOPs
- Aligning with DISA
  - Detail & timeline for NCES
  - Federation Points not yet defined

AGENDA

- PMW 160 Organization
- PMW 160 Programs & Projects
- Summary